

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicant: **Wen Lin, et al.**

Serial No.: **10/814,682**

Filed: **March 31, 2004**

Title: **SEMICONDUCTOR DEVICE HAVING A DOPED LATTICE  
MATCHING LAYER AND A METHOD OF MANUFACTURE  
THEREFOR**

Grp./A.U.: **2823**

Examiner: **Julio J. Maldonado**

Confirmation No.: **8308**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

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I hereby certify that this correspondence is being electronically filed with United States Patent and trademark Office on: <b>October 27, 2008</b> (Date)  <b>Elizabeth Schumacher</b> (Printed or typed name of person signing the certificate)  <u>Elizabeth Schumacher</u> (Signature of the person signing the certificate)
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ATTENTION: Board of Patent Appeals and Interferences

Sirs:

**APPEAL BRIEF UNDER 37 C.F.R. §41.37**

This is an appeal from a Final Rejection dated **May 2, 2008**, of Claims **41-53**. The Appellants submit this Brief with the statutory fee of \$540.00 as set forth in 37 C.F.R. §41.20(b)(2), and hereby authorize the Commissioner to charge any additional fees connected with this communication or credit any overpayment to Deposit Account No. **08-2395**.

This Brief contains these items under the following headings, and in the order set forth below in accordance with 37 C.F.R. §41.37(c)(1):

- I. REAL PARTY IN INTEREST
- II. RELATED APPEALS AND INTERFERENCES
- III. STATUS OF CLAIMS
- IV. STATUS OF AMENDMENTS
- V. SUMMARY OF CLAIMED SUBJECT MATTER
- VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL
- VII. APPELLANTS' ARGUMENTS
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## I. REAL PARTY IN INTEREST

The real party in interest in this appeal is the Assignee, Agere Systems Inc.

## II. RELATED APPEALS AND INTERFERENCES

No other appeals or interferences will directly affect, be directly affected by, or have a bearing on the Board's decision in this appeal.

## III. STATUS OF THE CLAIMS

Claims 41-53 are pending in this application and have been rejected under 35 U.S.C. §103 and claims 1-40 have been canceled without prejudice or disclaimer. Each of the pending claims is being appealed.

## IV. STATUS OF THE AMENDMENTS

The present Application was filed on March 31, 2004. The Appellants filed a preliminary amendment on March 31, 2004. The Appellants then filed a first Response on July 27, 2005 in response to a first Examiner's Action mailed April 20, 2005. The Appellants then filed a second Response on January 11, 2006 in response to a second Examiner's Action mailed October 14, 2005. The Appellants then filed a third Response on June 8, 2006 in response to a third Examiner's Action mailed March 21, 2006. The Appellants then filed a fourth Response on October 23, 2006 in response to a fourth Examiner's Action mailed August 22, 2006. The Examiner then issued an advisory action on November 3, 2006, wherein the Appellants filed a first RCE on November 21, 2006. The Appellants then filed a fifth Response on April 9, 2007 in response to a fifth Examiner's

Action mailed December 7, 2006. The Appellants then filed a second RCE with preliminary Amendment on October 31, 2007 in response to a sixth Examiner's Action mailed October 31, 2007. The Appellants then filed a sixth Response on March 18, 2008 in response to a seventh Examiner's Action mailed December 18, 2007. The Appellants then filed a seventh Response on July 2, 2008 in response to an eighth Examiner's Action mailed May 2, 2008. The Examiner then issued an advisory action on August 7, 2008, wherein the Appellants filed a notice of appeal and pre-appeal brief review document. The Review Board responded to the pre-appeal brief review document on September 26, 2008, and hence the following document is being filed.

#### V. SUMMARY OF CLAIMED SUBJECT MATTER

The present invention is directed, in general, to a semiconductor device, and more specifically, to a semiconductor device having a doped lattice matching layer. (*See, e.g.*, paragraph 1 of U.S. Patent Application Publication No.2004/0183160, which includes the published specification.)

Independent Claim 41 is directed to (1) a co-doped germanium buried layer **130** located over a doped substrate **110**, (2) a doped epitaxial layer **150** located over said co-doped germanium buried layer **130**, (3) a gate structure **165** located over said doped epitaxial layer **150**, said gate structure **165** including a gate dielectric **167** and gate electrode **169**, (4) source/drain regions **180** located within said doped epitaxial layer **150** proximate said gate structure **165**, wherein said source/drain regions **180** do not extend into said co-doped germanium buried layer **130**. (*See* paragraphs [0022] thru [0027, and the associated FIG. 1]) To assist the Examiner, reference characters have been associated

with the concise explanation of the subject matter of independent Claim 41. These reference characters should not be used to limit the scope of the concise explanation of independent Claim 41.

## VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The first issue presented for consideration in this appeal is whether Claims 41-52, as rejected by the Examiner, are patentably nonobvious in accordance with 35 U.S.C. §103(a) over U.S. Patent 5,500,391 to Bevk, *et al.* (“Bevk”) in view of U.S. Patent 5,891,769 to Liaw, *et al.* (“Liaw”). The second issue presented for consideration in this appeal is whether Claim 53, as rejected by the Examiner, is patentably nonobvious in accordance with 35 U.S.C. §103(a) over U.S. Patent 5,500,391 to Bevk, *et al.* (“Bevk”) in view of U.S. Patent 5,891,769 to Liaw, *et al.* (“Liaw”), and in further view of U.S. Patent No. 7,067,856 to Ramadani *et al.* (“Ram”).

## VII. APPELLANTS' ARGUMENT

The inventions set forth in independent Claim 41, and its dependent claims are neither anticipated by nor obvious over the references on which the Examiner relies.

### Rejection under 35 U.S.C. 103(a) over Bevk in view of Liaw

#### A. Rejection of Claim 41

The Examiner has rejected Claim 41 under 35 U.S.C. §103(a) as being unpatentable over Bevk in view of Liaw. The Appellants respectfully disagree.

Independent Claim 41 currently includes the element of source/drain regions located within a doped epitaxial layer proximate a gate structure, wherein the source/drain regions do not extend into

a co-doped germanium buried layer located thereunder. The Examiner correctly identifies on page 3 of the Examiner's Action dated December 18, 2007, as well as page 2 of the Examiner's Action dated May 2, 2008, that Bevk fails to teach or suggest the element that the source/drain regions do not extend into said co-doped germanium buried layer.

However, the Examiner asserts that Liaw teaches or suggests such an element. More specifically, the Examiner points the Applicants to FIG. 4 of Liaw, and the associated text at column 6, lines 17-39 therein. The Applicants respectfully disagree with the Examiner that FIG. 4, and the associated text, teaches or suggests the claimed element of source/drain regions located within a doped epitaxial layer proximate a gate structure, wherein the source/drain regions do not extend into a co-doped germanium buried layer located thereunder, as is presently claimed. For instance, all the text associated with FIG. 4 is directed to a SiC buried layer. Nothing in that text teaches or suggests that the SiC buried layer could be a co-doped germanium buried layer, as is presently claimed. The Examiner is correct that FIG. 1 teaches a co-doped germanium buried layer, however, the teachings and suggestions of FIG. 1 require that the source/drain regions thereof extend into the co-doped germanium buried layer, which is in direct contrast to that which is presently claimed. Moreover, nothing else exists with regard to FIG. 1 that might suggest that the source/drain regions thereof do not need to extend into the co-doped germanium buried layer thereof. Accordingly, Liaw also fails to teach or suggest this claimed element.

The Examiner goes on further to argue that Column 5, lines 36 thru 51 of Liaw suggests that the substrate discussed with respect to FIG. 4 may comprise a co-doped germanium buried layer. The Applicants again disagree with the Examiner on this supposed teaching or suggestion of Liaw. As the Examiner has clearly pointed out, Liaw suggests that its substrate discussed with regard to

FIG. 3 may comprise other heteroepitaxial films. However, Liaw does not suggest that those other heteroepitaxial films are a co-doped germanium buried layer. A teaching or suggestion that a film may comprise other materials is far from a teaching or suggestion that the film may comprise a co-doped germanium buried layer. Moreover, the Applicants believe it clear that this statement of Liaw is being made with regard to FIG 3, not its FIG. 4.

The Examiner goes even further to argue that the claimed limitation that the source/drain regions thereof do not need to extend into the co-doped germanium buried layer are just dimensional limitations that would be easily achieved through experimentation. The Applicants strongly suggest that the inclusion of a feature beyond a barrier that separates one material layer from another is not a dimensional limitation, as that element is defined in the cases cited by the Examiner. Accordingly, this argument of the Examiner is without merit.

Therefore, Bevk, individually or in combination with Liaw, fails to teach or suggest the invention recited in independent Claim 41. As such, the cited combination of Bevk and Liaw, as applied by the Examiner, does not establish a *prima facie* case of obviousness of independent Claim 41. Accordingly, the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claim 41 and allow issuance thereof.

#### B. Rejection of Claim 42

The Examiner has rejected Claim 42 under 35 U.S.C. §103(a) as being unpatentable over Bevk in view of Liaw. The Appellants believe the above arguments establish that the invention of independent Claim 41 is not obvious in view of the cited combination of Bevk and Liaw, and therefore are incorporating those arguments herein by reference. Dependent Claim 42 requires that

the co-doped germanium buried layer includes a p-type dopant. The cited combination of Bevk and Liaw, however, does not teach or suggest the use of the p-type dopant, in combination with the base claim limitations. Accordingly, Claim 42 is nonobvious over the cited combination of Bevk and Liaw and the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claim 42 and allow issuance thereof.

C. Rejection of Claim 43

The Examiner has rejected Claim 43 under 35 U.S.C. §103(a) as being unpatentable over Bevk in view of Liaw. The Appellants believe the above arguments establish that the invention of independent Claim 41 is not obvious in view of the cited combination of Bevk and Liaw, and therefore are incorporating those arguments herein by reference. Dependent Claim 43 requires that the co-doped germanium buried layer includes a p-type dopant of boron. The cited combination of Bevk and Liaw, however, does not teach or suggest the use of the p-type dopant of boron, in combination with the base claim limitations. Accordingly, Claim 43 is nonobvious over the cited combination of Bevk and Liaw and the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claim 43 and allow issuance thereof.

D. Rejection of Claim 44

The Examiner has rejected Claim 44 under 35 U.S.C. §103(a) as being unpatentable over Bevk in view of Liaw. The Appellants believe the above arguments establish that the invention of independent Claim 41 is not obvious in view of the cited combination of Bevk and Liaw, and



therefore are incorporating those arguments herein by reference. Dependent Claim 44 requires that the co-doped germanium buried layer has a germanium concentration ranging from about  $2 \times 10^{20}$  atoms/cm<sup>3</sup> to about  $7 \times 10^{20}$  atoms/cm<sup>3</sup>. The cited combination of Bevk and Liaw, however, does not teach or suggest the use of the co-doped germanium buried layer having a germanium concentration ranging from about  $2 \times 10^{20}$  atoms/cm<sup>3</sup> to about  $7 \times 10^{20}$  atoms/cm<sup>3</sup>, in combination with the base claim limitations. Accordingly, Claim 44 is nonobvious over the cited combination of Bevk and Liaw and the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claim 44 and allow issuance thereof.

E. Rejection of Claim 45

The Examiner has rejected Claim 45 under 35 U.S.C. §103(a) as being unpatentable over Bevk in view of Liaw. The Appellants believe the above arguments establish that the invention of independent Claim 41 is not obvious in view of the cited combination of Bevk and Liaw, and therefore are incorporating those arguments herein by reference. Dependent Claim 45 requires that the co-doped germanium buried layer has a thickness ranging from about 1  $\mu\text{m}$  to about 10  $\mu\text{m}$ . The cited combination of Bevk and Liaw, however, does not teach or suggest the use of the co-doped germanium buried layer having a thickness ranging from about 1  $\mu\text{m}$  to about 10  $\mu\text{m}$ , in combination with the base claim limitations. Accordingly, Claim 45 is nonobvious over the cited combination of Bevk and Liaw and the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claim 45 and allow issuance thereof.

F. Rejection of Claim 46

The Examiner has rejected Claim 46 under 35 U.S.C. §103(a) as being unpatentable over Bevk in view of Liaw. The Appellants believe the above arguments establish that the invention of independent Claim 41 is not obvious in view of the cited combination of Bevk and Liaw, and therefore are incorporating those arguments herein by reference. Dependent Claim 46 requires that the doped substrate, the co-doped germanium buried layer, and the epitaxial layer collectively have a thickness ranging from about 2  $\mu\text{m}$  to about 20  $\mu\text{m}$ . The cited combination of Bevk and Liaw, however, does not teach or suggest that the doped substrate, the co-doped germanium buried layer, and the epitaxial layer collectively have a thickness ranging from about 2  $\mu\text{m}$  to about 20  $\mu\text{m}$ , in combination with the base claim limitations. Accordingly, Claim 46 is nonobvious over the cited combination of Bevk and Liaw and the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claim 46 and allow issuance thereof.

G. Rejection of Claim 47

The Examiner has rejected Claim 47 under 35 U.S.C. §103(a) as being unpatentable over Bevk in view of Liaw. The Appellants believe the above arguments establish that the invention of independent Claim 41 is not obvious in view of the cited combination of Bevk and Liaw, and therefore are incorporating those arguments herein by reference. Dependent Claim 47 requires that a first doped lattice matching layer is located between the doped substrate and the co-doped germanium buried layer and a second doped lattice matching layer is located between the co-doped germanium buried layer and the doped epitaxial layer. The cited combination of Bevk and Liaw,

however, does not teach or suggest that a first doped lattice matching layer is located between the doped substrate and the co-doped germanium buried layer and a second doped lattice matching layer is located between the co-doped germanium buried layer and the doped epitaxial layer, in combination with the base claim limitations. Accordingly, Claim 47 is nonobvious over the cited combination of Bevk and Liaw and the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claim 47 and allow issuance thereof.

#### H. Rejection of Claim 48

The Examiner has rejected Claim 48 under 35 U.S.C. §103(a) as being unpatentable over Bevk in view of Liaw. The Appellants believe the above arguments establish that the invention of independent Claim 41 is not obvious in view of the cited combination of Bevk and Liaw, and therefore are incorporating those arguments herein by reference. Dependent Claim 48 requires that a first doped lattice matching layer is located between the doped substrate and the co-doped germanium buried layer and a second doped lattice matching layer is located between the co-doped germanium buried layer and the doped epitaxial layer, and further wherein dopant concentrations of the first and second doped lattice matching layers are each less than a dopant concentration of the co-doped germanium buried layer. The cited combination of Bevk and Liaw, however, does not teach or suggest that a first doped lattice matching layer is located between the doped substrate and the co-doped germanium buried layer and a second doped lattice matching layer is located between the co-doped germanium buried layer and the doped epitaxial layer, and further wherein dopant concentrations of the first and second doped lattice matching layers are each less than a dopant

concentration of the co-doped germanium buried layer, in combination with the base claim limitations. Accordingly, Claim 48 is nonobvious over the cited combination of Bevk and Liaw and the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claim 48 and allow issuance thereof.

#### I. Rejection of Claim 49

The Examiner has rejected Claim 49 under 35 U.S.C. §103(a) as being unpatentable over Bevk in view of Liaw. The Appellants believe the above arguments establish that the invention of independent Claim 41 is not obvious in view of the cited combination of Bevk and Liaw, and therefore are incorporating those arguments herein by reference. Dependent Claim 49 requires that a first doped lattice matching layer is located between the doped substrate and the co-doped germanium buried layer and a second doped lattice matching layer is located between the co-doped germanium buried layer and the doped epitaxial layer, and further wherein dopant concentrations of the first and second doped lattice matching layers are each less than a dopant concentration of the co-doped germanium buried layer, and even further wherein a dopant concentration of the doped substrate is less than the dopant concentration of the first doped lattice matching layer and a dopant concentration of the doped epitaxial layer is less than the dopant concentration of the second doped lattice matching layer. The cited combination of Bevk and Liaw, however, does not teach or suggest that a first doped lattice matching layer is located between the doped substrate and the co-doped germanium buried layer and a second doped lattice matching layer is located between the co-doped germanium buried layer and the doped epitaxial layer, and further wherein dopant concentrations of the first and second doped lattice matching layers are each less than a dopant concentration of the co-

doped germanium buried layer, and further wherein a dopant concentration of the doped substrate is less than the dopant concentration of the first doped lattice matching layer and a dopant concentration of the doped epitaxial layer is less than the dopant concentration of the second doped lattice matching layer, in combination with the base claim limitations. Accordingly, Claim 49 is nonobvious over the cited combination of Bevk and Liaw and the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claim 49 and allow issuance thereof.

#### J. Rejection of Claim 50

The Examiner has rejected Claim 50 under 35 U.S.C. §103(a) as being unpatentable over Bevk in view of Liaw. The Appellants believe the above arguments establish that the invention of independent Claim 41 is not obvious in view of the cited combination of Bevk and Liaw, and therefore are incorporating those arguments herein by reference. Dependent Claim 50 requires that a first doped lattice matching layer is located between the doped substrate and the co-doped germanium buried layer and a second doped lattice matching layer is located between the co-doped germanium buried layer and the doped epitaxial layer, and further wherein dopant concentrations of the first and second doped lattice matching layers are each less than a dopant concentration of the co-doped germanium buried layer, and even further wherein a third doped lattice matching layer is located between the first doped lattice matching layer and the co-doped germanium buried layer and a fourth doped lattice matching layer is located between the second doped lattice matching layer and the co-doped germanium buried layer. The cited combination of Bevk and Liaw, however, does not teach or suggest that a first doped lattice matching layer is located between the doped substrate and

the co-doped germanium buried layer and a second doped lattice matching layer is located between the co-doped germanium buried layer and the doped epitaxial layer, and further wherein dopant concentrations of the first and second doped lattice matching layers are each less than a dopant concentration of the co-doped germanium buried layer, and even further wherein a third doped lattice matching layer is located between the first doped lattice matching layer and the co-doped germanium buried layer and a fourth doped lattice matching layer is located between the second doped lattice matching layer and the co-doped germanium buried layer, in combination with the base claim limitations. Accordingly, Claim 50 is nonobvious over the cited combination of Bevk and Liaw and the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claim 50 and allow issuance thereof.

K. Rejection of Claim 51

The Examiner has rejected Claim 51 under 35 U.S.C. §103(a) as being unpatentable over Bevk in view of Liaw. The Appellants believe the above arguments establish that the invention of independent Claim 41 is not obvious in view of the cited combination of Bevk and Liaw, and therefore are incorporating those arguments herein by reference. Dependent Claim 50 requires that a first doped lattice matching layer is located between the doped substrate and the co-doped germanium buried layer and a second doped lattice matching layer is located between the co-doped germanium buried layer and the doped epitaxial layer, and further wherein dopant concentrations of the first and second doped lattice matching layers are each less than a dopant concentration of the co-doped germanium buried layer, and even further wherein a third doped lattice matching layer is located between the first doped lattice matching layer and the co-doped germanium buried layer and

a fourth doped lattice matching layer is located between the second doped lattice matching layer and the co-doped germanium buried layer, and yet even further that a dopant concentration of the third doped lattice matching layer is more than the dopant concentration of the first doped lattice matching layer and a dopant concentration of the fourth doped lattice matching layer is more than the dopant concentration of the second doped lattice matching layer. The cited combination of Bevk and Liaw, however, does not teach or suggest that a first doped lattice matching layer is located between the doped substrate and the co-doped germanium buried layer and a second doped lattice matching layer is located between the co-doped germanium buried layer and the doped epitaxial layer, and further wherein dopant concentrations of the first and second doped lattice matching layers are each less than a dopant concentration of the co-doped germanium buried layer, and even further wherein a third doped lattice matching layer is located between the first doped lattice matching layer and the co-doped germanium buried layer and a fourth doped lattice matching layer is located between the second doped lattice matching layer and the co-doped germanium buried layer, and yet even further that a dopant concentration of the third doped lattice matching layer is more than the dopant concentration of the first doped lattice matching layer and a dopant concentration of the fourth doped lattice matching layer is more than the dopant concentration of the second doped lattice matching layer, in combination with the base claim limitations. Accordingly, Claim 51 is nonobvious over the cited combination of Bevk and Liaw and the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claim 51 and allow issuance thereof.

L. Rejection of Claim 52

The Examiner has rejected Claim 52 under 35 U.S.C. §103(a) as being unpatentable over Bevk in view of Liaw. The Appellants believe the above arguments establish that the invention of independent Claim 41 is not obvious in view of the cited combination of Bevk and Liaw, and therefore are incorporating those arguments herein by reference. Dependent Claim 52 requires that a first doped lattice matching layer is located between the doped substrate and the co-doped germanium buried layer and a second doped lattice matching layer is located between the co-doped germanium buried layer and the doped epitaxial layer, and further wherein first and second doped lattice matching layers each include a dopant gradient wherein a dopant concentration of each of the dopant gradients is greater adjacent the co-doped germanium buried layer. The cited combination of Bevk and Liaw, however, does not teach or suggest that a first doped lattice matching layer is located between the doped substrate and the co-doped germanium buried layer and a second doped lattice matching layer is located between the co-doped germanium buried layer and the doped epitaxial layer, and further wherein first and second doped lattice matching layers each include a dopant gradient wherein a dopant concentration of each of the dopant gradients is greater adjacent the co-doped germanium buried layer, in combination with the base claim limitations. Accordingly, Claim 52 is nonobvious over the cited combination of Bevk and Liaw and the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claim 52 and allow issuance thereof.

Rejection under 35 U.S.C. 103(a) over Bevk in view of Liaw, and further in view of Ram

M. Rejection of Claim 53



The Examiner has rejected Claim 53 under 35 U.S.C. §103(a) as being unpatentable over Bevk in view of Liaw, and in further view of Ram. The Appellants again respectfully disagree.

As indicated above, independent Claim 41 currently includes the element of source/drain regions located within a doped epitaxial layer proximate a gate structure, wherein the source/drain regions do not extend into a co-doped germanium buried layer located thereunder. As established above, each of Bevk and Liaw fails to teach or suggest this claimed element. Ram, as applied by the Examiner, fails to correct their deficiencies.

The Examiner is offering Ram for the sole proposition that interconnects may be located within interlevel dielectric layers positioned over the transistors, thereby connecting the transistors to form an operational integrated circuit. Notwithstanding the accuracy of the Examiner's proposition, a teaching or suggestion that interconnects may be located within interlevel dielectric layers positioned over the transistors, thereby connecting the transistors to form an operational integrated circuit, is very different from a teaching or suggestion of source/drain regions located within a doped epitaxial layer proximate a gate structure, wherein the source/drain regions do not extend into a co-doped germanium buried layer located thereunder, as is presently claimed. Accordingly, Ram, as applied by the Examiner, also fails to teach or suggest this claimed element.

Therefore, Bevk, individually or in combination with Liaw and/or Ram, fails to teach or suggest the invention recited in independent Claim 41 and its dependent claims, when considered as a whole. As such, the cited combination of Bevk, Liaw and Ram, as applied by the Examiner, does not establish a *prima facie* case of obviousness of independent Claim 41 and Claims that depend thereon. Accordingly, the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of Claim 53 and allow issuance thereof.

For the reasons set forth above, the Claims on appeal are not patentably nonobvious over Bevk, Liaw and/or Ram. Accordingly, the Appellant respectfully requests that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of all of the Appellant's pending claims.

Respectfully submitted,

**HITT GAINES, P.C.**

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## VIII. APPENDIX A - CLAIMS

Claims 1-40 (Canceled)

41. (Previously Presented) A semiconductor device, comprising:  
a co-doped germanium buried layer located over a doped substrate;  
a doped epitaxial layer located over said co-doped germanium buried layer  
a gate structure located over said doped epitaxial layer, said gate structure including a gate dielectric and gate electrode; and  
source/drain regions located within said doped epitaxial layer proximate said gate structure, wherein said source/drain regions do not extend into said co-doped germanium buried layer.
42. (Previously Presented) The semiconductor device as recited in Claim 41 wherein said co-doped germanium buried layer includes a p-type dopant.
43. (Previously Presented) The semiconductor device as recited in Claim 42 wherein said p-type dopant is boron.
44. (Previously Presented) The semiconductor device as recited in Claim 41 wherein said co-doped germanium buried layer has a germanium concentration ranging from about  $2 \times 10^{20}$  atoms/cm<sup>3</sup> to about  $7 \times 10^{20}$  atoms/cm<sup>3</sup>.

45. (Previously Presented) The semiconductor device as recited in Claim 41 wherein said co-doped germanium buried layer has a thickness ranging from about 1  $\mu\text{m}$  to about 10  $\mu\text{m}$ .

46. (Previously Presented) The semiconductor device as recited in Claim 41 wherein said doped substrate, said co-doped germanium buried layer, and said epitaxial layer collectively have a thickness ranging from about 2  $\mu\text{m}$  to about 20  $\mu\text{m}$ .

47. (Previously Presented) The semiconductor device as recited in Claim 41 wherein a first doped lattice matching layer is located between said doped substrate and said co-doped germanium buried layer and a second doped lattice matching layer is located between said co-doped germanium buried layer and said doped epitaxial layer.

48. (Previously Presented) The semiconductor device as recited in Claim 47 wherein dopant concentrations of said first and second doped lattice matching layers are each less than a dopant concentration of said co-doped germanium buried layer.

49. (Previously Presented) The semiconductor device as recited in Claim 48 wherein a dopant concentration of said doped substrate is less than said dopant concentration of said first doped lattice matching layer and a dopant concentration of said doped epitaxial layer is less than said dopant concentration of said second doped lattice matching layer.

50. (Previously Presented) The semiconductor device as recited in Claim 48 further

including a third doped lattice matching layer located between said first doped lattice matching layer and said co-doped germanium buried layer and a fourth doped lattice matching layer located between said second doped lattice matching layer and said co-doped germanium buried layer.

51. (Previously Presented) The semiconductor device as recited in Claim 50 wherein a dopant concentration of said third doped lattice matching layer is more than said dopant concentration of said first doped lattice matching layer and a dopant concentration of said fourth doped lattice matching layer is more than said dopant concentration of said second doped lattice matching layer.

52. (Previously Presented) The semiconductor device as recited in Claim 47 wherein said first and second doped lattice matching layers each include a dopant gradient wherein a dopant concentration of each of said dopant gradients is greater adjacent said co-doped germanium buried layer.

53. (Previously Presented) The semiconductor device as recited in Claim 41, further including interconnects located within interlevel dielectric layers for contacting said transistor

## IX. APPENDIX B - EVIDENCE

The evidence in this appendix includes a U.S. Patent to Bevk, one to Liaw, and one to Ram. Bevk was entered in the record by the Examiner with the Examiner's Action dated April 20, 2005. Liaw and Ram were entered in the record by the Examiner with the Examiner's Action dated August 22, 2006.

X. RELATED PROCEEDINGS APPENDIX

NONE